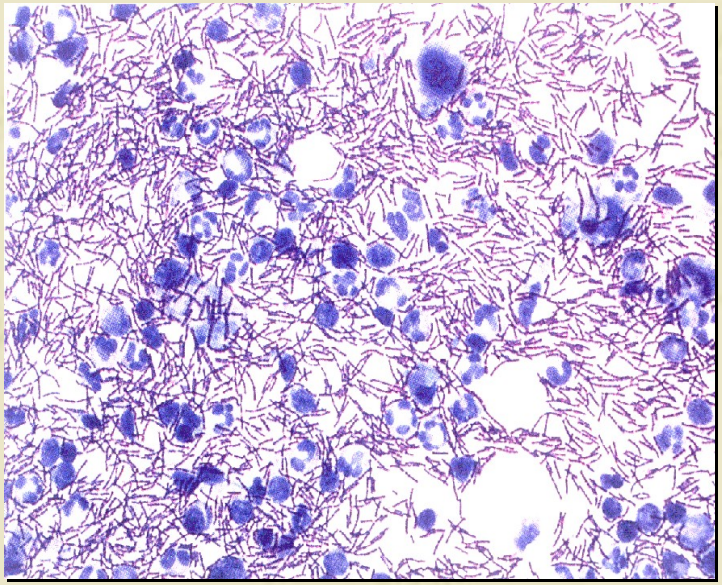
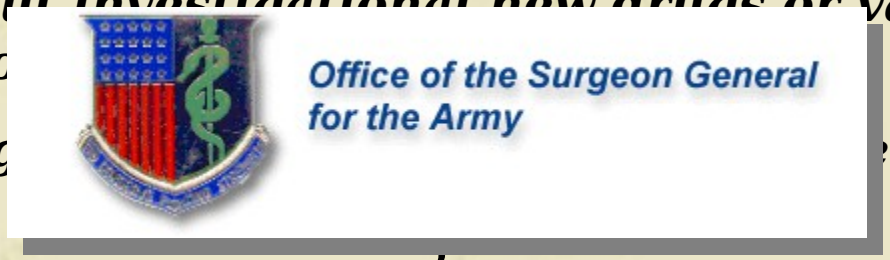
Medical NBC Briefing Series

Medical NBC Aspects of **ANTHRAX**



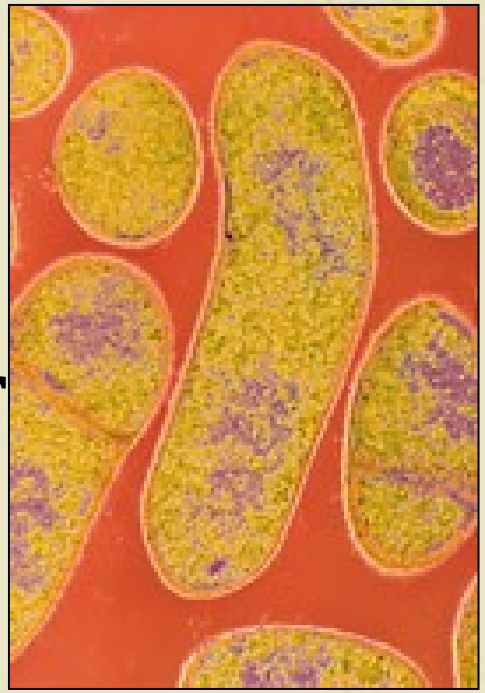
Purpose

- ***This presentation is part of a <u>series</u> developed by the Medical NBC Staff at The U.S. Army Office of The Surgeon General.***
- ***The information presented addresses medical issues, both operational and clinical, of various NBC agents.***
- ***These presentations were developed for the medical NBC officer to use in briefing either medical or maneuver commanders.***
- ***Information in the presentations includes physical data of the agent, signs and symptoms, means of dispersion, treatment for the agent, medical resources required, issues about investigational new drugs or vaccines, and epidemiolo***
- ***Notes pag*** ***nce.***



Outline

- Background
- Battlefield Response
- Medical Response
- Command and Contr
- Summary
- References

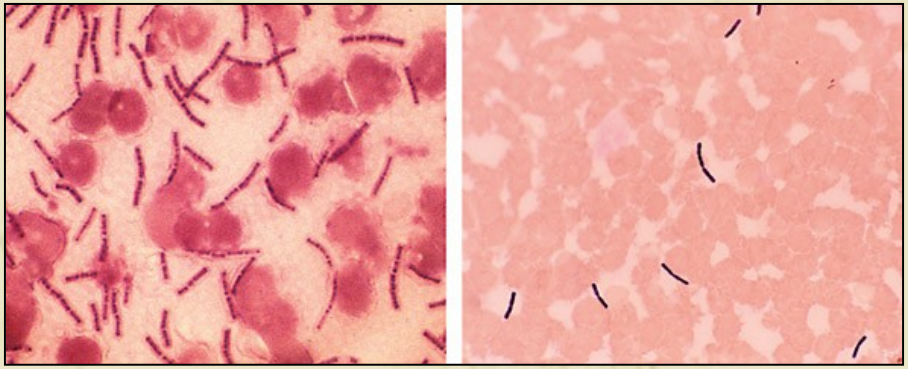


Background

- General Background
- Anthrax Disease Course Summary
- Disease Background
- Signs and Symptom
- Diagnosis
- Treatment
- Current Situation
- Weaponization

General Background

- **Spore forming bacteria – *Bacillus anthracis***
- **Occurs naturally in sheep, cattle, horses, and swine**



General Background (cont.)

- Disease of antiquity
- 1876 - the first disease for which a microbial etiology was established (Koch)
- 1881 - the first effective live bacterial vaccine (Pasteur)
- Reservoir in the soil
- Epizootic and enzootic anthrax a problem in Iran, Pakistan, Sudan, and Haiti
- Woolsorters disease (inhalation anthrax)

Anthrax Disease Course Summary (Inhalation)

Day 1	Day 2	Day 3	Day 4	Day 5
EXPOSURE	Patients ambulatory Incubation 1-6 Days →			
Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Incubation →	Fever, malaise, fatigue, cough, mild chest discomfort, respiratory distress SHOCK and DEATH near 100% mortality → Patients littered			
Day 11	**Day 12**	**Day 13**	**Day 14**	**Day 15**

Disease Background

Spores may persist for years in soil and require high temperature or direct exposure to proper disinfectant for killing

- Soil, ambient temperature: <12 years
- Dry heat at 150ºC: Killed in 60 minutes
- Dry heat at 100ºC: Half killed in 7 minutes

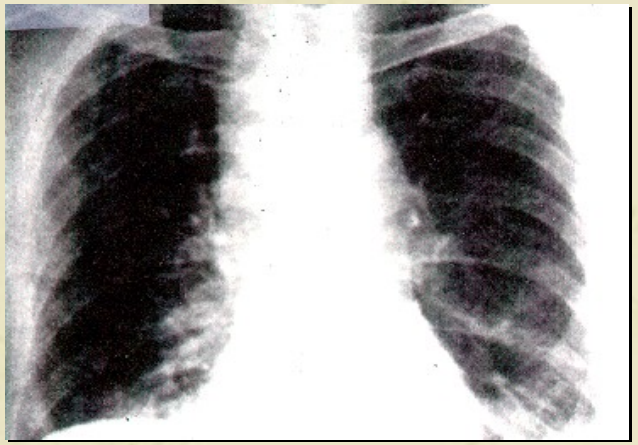
Disease Background

Forms of the disease

- Cutaneous
- Gastrointestinal
- Inhalation

Cutaneous

Gastrointestinal



Inhalation

Cutaneous Anthrax

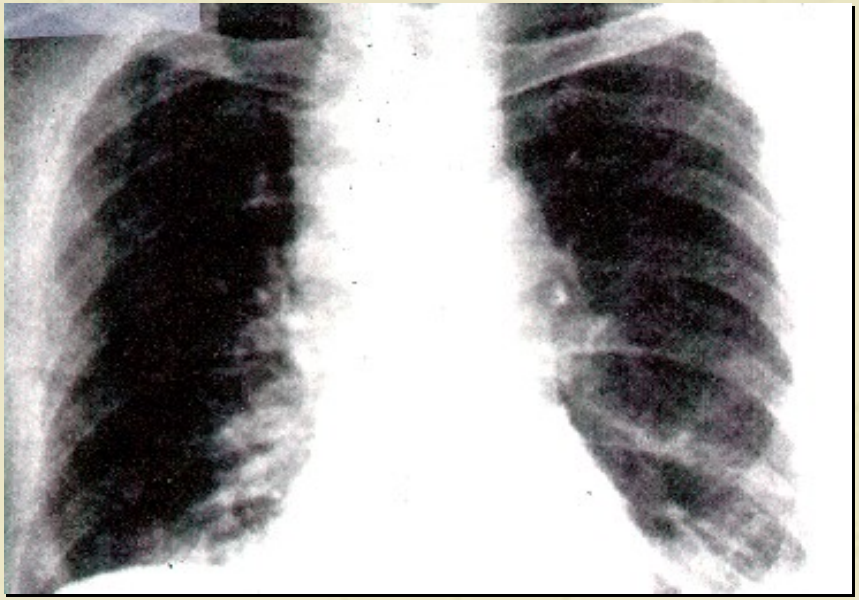
- 95% of all endemic cases
- 24 to 48 hours - black ulcer
- Lesion usually painless
- Untreated: 20% case-fatality

Gastrointestinal Anthrax

- Ingestion of raw or inadequately cooked contaminated meat
- Acute stomach pain, vomiting, bloody diarrhea
- Mortality rate 50 to 100% even with aggressive antibiotic treatment

Inhalation Anthrax

- Inhalation of spores into the lower respiratory tract
- Likely BW form of the disease



Signs and Symptoms of Inhalation Anthrax

- Incubation period: 1 to 6 days
- Initial symptoms (2 to 5 days)
  - Non-specific malaise
  - Low-grade fever
  - Non-productive cough
- Terminal symptoms (Hemorrhagic mediastinitis)
  - Abrupt onset of difficulty breathing
  - Rapid progression to shock and death

Diagnosis
Clinical

- Large numbers of respiratory patients presenting at the same time
- Early diagnosis is essential for survival
- X-ray

Diagnosis Laboratory

- **Positive blood and CSF cultures**
- **Gram stains may be positive late in course**
- **Kits and assays will detect lethal levels of toxin**
  - Kits only detect toxin in terminal phase
- **No toxin or bacilli in peripheral blood early in disease**
  - Blood sampling must be done on Day 3 or 4

Treatment Pre-Exposure Prophylaxis

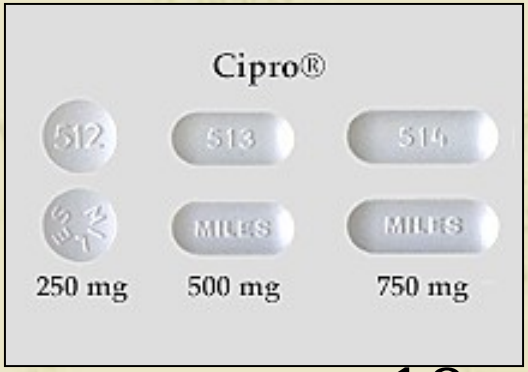
- Vaccine fully approved and licensed by the FDA since 1972 and does not require informed consent
- Formerly manufactured by Michigan State Department of Public Health
- Demonstrated safety and efficacy in human and primate studies
- >7,900 doses given at USAMRIID alone through June 1993
- Approximately 150,000 service members immunized with this vaccine during Desert Shield/Desert Storm (25 to 30% of deployed force)

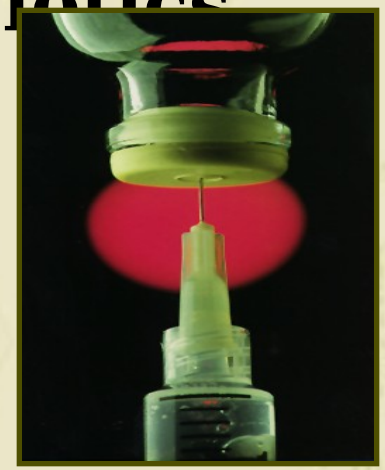
Treatment Pre-Exposure Prophylaxis

- Three injections are given at 0, 2, and 4 weeks
- Three more injections are given at 6, 12, and 18 months after the initial injection
- If immunity is to be maintained, a booster injection of 0.5 ml is given at one-year intervals

Treatment
Post Exposure Prophylaxis

- Start <24 hours after exposure
- Continue for at least 1 month with concurrent vaccine
- Minimum of three doses of vaccine with concurrent antibiotics





Treatment

- **Supportive care – special attention to increased respiratory symptoms**
  - Oxygen
  - Hydration
  - Ventilation support for severe cases
- **Medications**
  - Ciprofloxacin, 400 mg I.V. every 8 to 12 hours
  - Doxycycline, 200 mg I.V., then 100 Mg I.V. every 12 hours

Current Situation

Biological properties of *Bacillus anthracis* that make it a biological warfare threat:

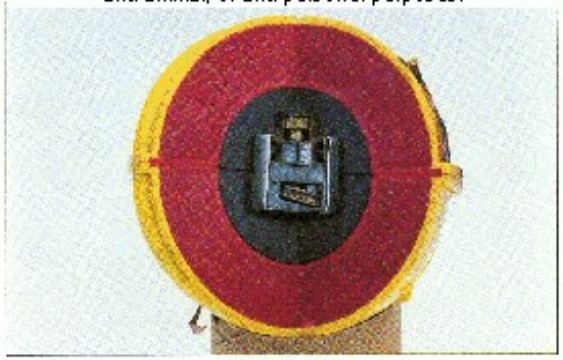
- Easy to produce in large quantities
- Short incubation period
- Lethal effects – mortality of almost 100%
- Spores infectious by aerosol: 8,000 to 20,000 spores can cause infection
- Spore concentration near source of dissemination as high as 100,000 spores per liter of air (about one deep breath) easily achieved

Weaponization

Aerosolization

- Well suited for delivery by bombs or missiles
- Inhalation and contamination of food, water, and other surfaces
- Delivery systems
  - Agricultural sprayer
  - Fire extinguisher
  - Crop duster or boat
  - Bomblets
  - Aircraft
- Less than 500 grams can cover an area less that 10 km^2

M143 Biological bomb - used for anti-crop, anti-animal, or anti-personel purposes.



Battlefield Response to Anthrax

- **Detect**
- **Protect**
  - Individual protection
  - Collective protection

Detection

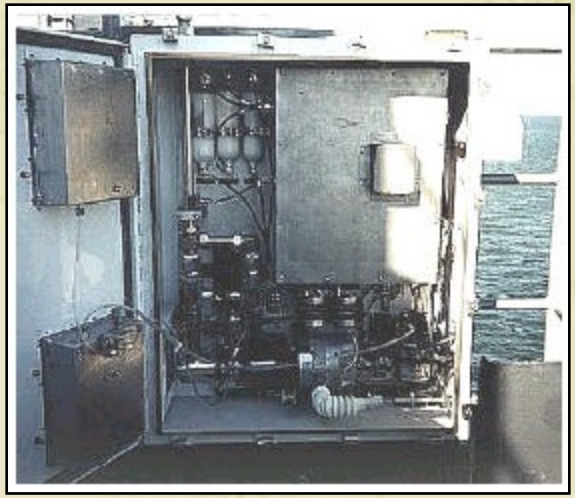
- **Possible methods of detection**
  - Detection of agent in the environment
  - Clinical (differential diagnosis)
  - Medical surveillance (coordination enhances detection capability)
- **PVNTMED personnel test water and food sources**
- **Diagnosis of anthrax is not presumptive of a BW attack – anthrax is naturally occurring**

Detection of Agent in the Environment

- **Biological Smart Tickets**
- **Enzyme-Linked Immunosorbant Assay (ELISA) (Fielded with the 520th TAML)**
- **Polymerase Chain Reaction (PCR) (Fielded with the 520th TAML)**

Detection of Agent in the Environment (cont.)

- **M31E1 Biological Integrated Detection System (BIDS)**
- **Interim Biological Agent Detector (IBAD)**



Clinical Detection

Sudden presentation of

- Respiratory syndromes presenting in groups
- Extremely rapid progression of symp

Clinical Detection Laboratory Confirmation

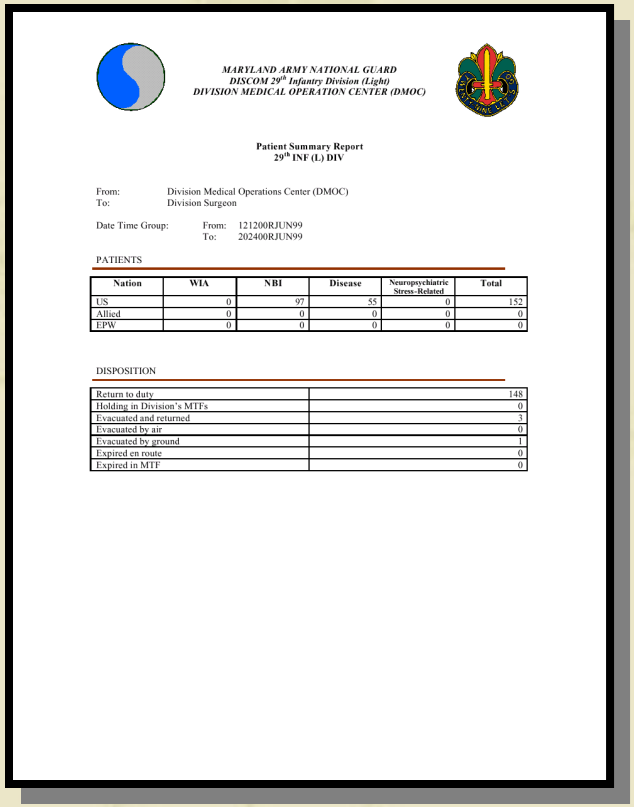
- **Division medical assets lack lab equipment to conduct test to determine anthrax**
- **Specimen must be sent to theater level or CONUS lab**
  - Unit SOP's for collection
- **Lab specimens should be submitted to the correct diagnostic laboratory**
  - Responsibility of the Lab Officer
  - Ensure the chain of command is aware of the situation
- **Contact lab prior to collection or**

Clinical Detection Laboratory Confirmation

Points of contact for biological sampling and shipping

- Corps Chemical Offi
- Technical Escort Un
- AFMIC
- 520th TAML
- USAMRIID
- WRAIR
- CDC

Detection
Medical Surveillance



MARYLAND ARMY NATIONAL GUARD
DISCOM 29th Infantry Division (Light)
DIVISION MEDICAL OPERATION CENTER (DMOC)

Patient Summary Report
29th INF (L) DIV

From: Division Medical Operations Center (DMOC)
To: Division Surgeon

Date Time Group: From: 121200RJUN99
To: 202400RJUN99

PATIENTS

Nation	WIA	NBI	Disease	Neuropsychiatric Stress-Related	Total
US	0	97	55	0	152
Allied	0	0	0	0	0
EPW	0	0	0	0	0

DISPOSITION

Return to duty	148
Holding in Division's MTFs	0
Evacuated and returned	3
Evacuated by air	0
Evacuated by ground	1
Expired en route	0
Expired in MTF	0

Clues in the daily medical disposition reports

- Unexpected high numbers of acute respiratory syndromes, coughing, chest pain, fatigue, and fever

Protect
Individual Protection

- Mask only is sufficient for respiratory protection against anthrax
- Standard uniform clothing affords a reasonable protection against dermal exposure to biological agents
- Casualties unable to wear MOPP should be handled in casualty wraps

Protect
Collective Protection

- Hardened or unhardened shelter equipped with an air filtration unit providing overpressure
- Standard universal precautions should be employed as individuals are brought inside the collective protection units
- Anthrax is not communicable from person to person
- Water must be thoroughly disinfected
- All food must be thoroughly heated to kill any organisms

Medical Response to Anthrax

- Triage and Evacuation
- Infection Control
- Resource Requirements

Triage and Evacuation

- **Triage**
  - Priorities based on severity of symptoms
  - Respiratory support needs will increase priorities
- **Evacuation – Immediate**
  - Required of all severely symptomatic patients in Echelons I & II; Echelons III &IV based on priority
  - Standard evacuation assets may be used
  - Observe standard infection control precautions during evacuation
- **Evacuation of patients will be METT-T dependent. Commanders must confer with MTF prior to evacuation**

Infection Control

- **Anthrax is not communicable from person to person**
- **Universal precautions apply for patient handling**
- **Food, water, and article decontamination (PVNTMED)**
- **Patient remains - Quartermaster section**
  - De in her

Resource Requirements

- **Evacuation Assets**
- **Supportive therapi**
  - Antibiotics
  - Oxygen
- **Intensive care facilities for severely respiratory-compromised patients**

Command and Control

- **Intelligence**
  - Medical surveillance and intelligence reports are key to keep the Command alert to the situation
- **Maneuver**
  - Quarantine is unnecessary
- **Logistics**
  - Additional Class VIII materials will be required
  - Evacuation routes will be heavily utilized
- **Manpower**
  - Potential for very large number of casualties may drastically reduce available manpower
  - Additional manpower demands for evacuation and treatment of the casualties

Command and Control Response to Psychological Impact

- **May vary from person to person**
- **Psychological Operations**
  - Rumors, panic, misinformation
  - Soldiers may isolate themselves in fear of disease spread
  - Physical appearance of the rash may adversely affect other soldiers
- **Countermeasures**
  - LEADERSHIP is responsible for countering psychological impacts through education and training of the soldiers

Summary

- **Anthrax is easily aerosolized and disseminated**
- **Anthrax has been weponized**
- **Detection may not occur until after exposure when patients are reported**
- **Command decisions that will be required upon detection of anthrax:**
  - Evacuation: Many patients will be presenting at one time. Methods of evacuation?
  - Treatment: Procuring additional antibiotics to treat exposed individuals.

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